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[54] **CASCADABLE DIGITAL FILTER PROCESSOR EMPLOYING MOVING COEFFICIENTS**

[75] Inventors: **Mordecai Barkan**, Palo Alto, Calif.; **Alex Genusov**; **Michael Granski**, both of Haifa, Israel; **Paul Budnik**, Los Gatos, Calif.; **Refael Retter**, Haifa, Israel

[73] Assignee: **Zoran Corporation**, Santa Clara, Calif.

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[52] **U.S. Cl.** **364/724.1**; 364/724.13

[58] **Field of Search** 364/724, 728; 375/96, 375/103

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,323,980	4/1982	Houdard et al.	364/724
4,346,475	8/1982	Alexis	364/728
4,493,048	1/1985	Kung et al.	364/724
4,546,445	10/1985	Haugen	364/728
4,584,659	4/1986	Stikvoort	364/724
4,646,327	2/1987	Kojima et al.	364/724

OTHER PUBLICATIONS

H. T. Kung, *Why Systolic Architectures?*, Computer, vol. 15, No. 1, Jan. 82, pp. 37–46, IEEE, Long Beach, CA.

Primary Examiner—Gary V. Harkcom
Assistant Examiner—Long Thanh Nguyen
Attorney, Agent, or Firm—Flehr, Hohbach, Test, Albritton & Herbert

[57] **ABSTRACT**

A digital filter processor employs four multiplier-accumulator cells and an output accumulator for receiving and accumulating all cell outputs. Data is provided to all cells in parallel, and finite impulse coefficients are applied serially to all cells. A plurality of registers and at least one multiplexer interconnect the cells for transmitting the coefficients between cells. The registers can be employed for sample rate reduction or decimation. A plurality of processors can be cascaded for processing an increased number of coefficients without a reduction in sample time. Alternatively, data can be recycled in a processor to accommodate a number of coefficients greater than the number of cells at a reduced sampled sample rate. A cell address is provided for selecting cell outputs during the reading of the filtered/processed data.

11 Claims, 12 Drawing Sheets